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Marsden et al.

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(54) FINGER HOVER DETECTION FOR IMPROVED TYPING

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(56) References Cited

U.S. PATENT DOCUMENTS

4,725,694 A	2/1988	Auer et al.
4,805,222 A	2/1989	Young et al.
5,404,458 A	4/1995	Zetts
5,416,498 A	5/1995	Grant
6,029,578 A	2/2000	Weil et al.

6,396,483 B1	5/2002	Hiller
6,492,979 B1	12/2002	Kent et al.
6,504,530 B1	1/2003	Wilson et al.
6,525,717 B1	2/2003	Tang
6,563,492 B1	5/2003	Furuya
6,625,460 B1	9/2003	Patil
6,650,318 B1	11/2003	Arnon
6,657,616 B2	12/2003	Sims
6,707,448 B1	3/2004	Kunimatsu et al.

(Continued)

FOREIGN PATENT DOCUMENTS

CN	1075222 A	8/1993		
CN	2662340 Y	12/2004		
	(Con	(Continued)		

OTHER PUBLICATIONS

Office Action, dated May 15, 2015, received in U.S. Appl. No. 13/308,428, 26 pages.

(Continued)

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(57) ABSTRACT

Typing on touchscreens is improved by dynamically and automatically positioning the desired home-row keys of an onscreen keyboard below the user's fingers while their fingers are hovering above the surface, thus reducing the need for the user to look at the onscreen keyboard while typing. The location of each of the user's fingers while hovering and/or resting is monitored. Correlation between the hover sensor data and touch sensor data increases the confidence level by which the system can determine which of the user's fingers were used to select a key. By determining which finger was used to make the selection, the system accurately disambiguates which letter the user intended to type.

19 Claims, 18 Drawing Sheets

